REPORT RESUMES

ED 018 547 VT 000 773

OCCUPATIONAL COMPETENCY TESTS, PROCEDURES AND INSTRUCTIONS FOR CONSTRUCTION OR REVISION.

OHIO STATE DEPT. OF EDUCATION, COLUMBUS

PUB DATE 62

EDRS PRICE MF-$0.25 HC-$1.80 43P.

DESCRIPTORS- *TRADE AND INDUSTRIAL EDUCATION, EVALUATION, *TEST CONSTRUCTION, *OCCUPATIONAL TESTS, TESTING, PERFORMANCE TESTS,

THIS WILL SERVE AS A GUIDE TO THOSE WHO UNDERTAKE THE ASSIGNMENT OF WRITING AN OCCUPATIONAL COMPETENCY TEST IN A SPECIALIZED FIELD, WORKING IN COLLABORATION WITH A TEACHER EDUCATOR, FACULTY ADVISOR, OR OTHER QUALIFIED STAFF MEMBER. INFORMATION IS GIVEN ON THE PURPOSE AND NATURE OF OCCUPATIONAL COMPETENCY TESTS, TEST DEVELOPMENT PROCEDURES, TEST CONSTRUCTION, TEST ADMINISTRATION PROCEDURES, AND EVALUATION OF TEST RESULTS. A BIBLIOGRAPHY OF RELATED READINGS WHICH DATE FROM 1935 TO 1960 IS INCLUDED. THE APPENDIX CONTAINS OBJECTIVES IN SELECTING SUGGESTED PERFORMANCE JOBS, SUGGESTIONS AND EXAMPLES FOR THE TEST WRITER, INSTRUCTIONS FOR EXAMINERS, RATING SHEETS, AND SAMPLES OF TEST TYPES. (EM)

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OCCUPATIONAL COMPENTENCY TESTS

PROCEDURES AND INSTRUCTIONS FOR CONSTRUCTION OR REVISION

OHIO TRADE AND INDUSTRIAL EDUCATION SERVICE

DIVISION OF VOCATIONAL EDUCATION
STATE DEPARTMENT OF EDUCATION
Columbus, Ohio

VT000773

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OCCUPATIONAL COMPENTENCY TESTS

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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PROCEDURES AND INSTRUCTIONS FOR CONSTRUCTION OR REVISION

OHIO TRADE AND INDUSTRIAL EDUCATION SERVICE

DIVISION OF VOCATIONAL EDUCATION
STATE DEPARTMENT OF EDUCATION
Columbus, Ohio

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Edited and distributed by the:
Trade and Industrial Education
Instructional Materials Laboratory
The Ohio State University
College of Education
Columbus 10, Ohio

ACKNOWLEDGMENT

This manual was originally developed in 1953 by the Trade and Industrial Education State Staff Research Committee.

The material contained in this publication has been developed by (1) a review of occupational competency testing plans from other states, (2) an evaluation and reorganization of certain of the more pertinent information as well as the addition of certain elements of concern to Ohio, and (3) agreement on the part of the approved teacher education centers engaged in the development and/or utilization of occupational competency tests. This publication should serve as a coordinating influence among the teacher education centers and contribute to a more uniform pattern for such testing within the state.

Acknowledgment is extended to this committee and also the Vocational Curriculum Development and Industrial Teacher Training Bureau, The State Education Department, The University of the State of New York for permission to use selected samples of their materials.

Acknowledged also are Dr. D. H. Price, G. E. Williams, and Dr. Robert M. Reese, who acted as the 1961 Revision Committee of the state staff to revise and improve the original publication.

Byrl R. Shoemaker, Supervisor
Trade and Industrial Education Services

MEMORANDUM TO TEACHER EDUCATOR

These instructions are to serve as a general guide to those who undertake the special assignment of writing an occupational competency test in a specialized field, working in collaboration with a teacher educator, faculty advisor and/or other qualified staff member. The preparation of such a test may become an assignment to one or two competent persons who have previously had experience in developing and using objective tests.

Because of the wide variety and range of subject matter in different areas of trade, service, and technical occupations, a close working relationship of the collaborators must be maintained. The prerequisites stated above tend to establish an interest in the problems of testing and the techniques of test construction. These are sustained by further appreciation of the importance of occupational competency testing and the honor of having been selected to be a contributor to this worthwhile project. Furthermore, a person with the above experiences is in a better position to understand and carry out the directions which are prescribed in this manual.

The actual preparation of the questions for the competency tests as described under Test Construction may be performed by individuals who are working for undergraduate or graduate credit.

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SECTION A. OCCUPATIONAL COMPETENCY TESTS

PURPOSE

The general purpose of occupational competency tests is to appraise, as accurately and fairly as possible, the skill and technology required of those who propose to teach the intricacies and practices to others. Such tests may serve at least two purposes:

1. To screen qualified applicants for better than average ability in order to establish their eligibility and range of occupational experience required for temporary teacher certification as outlined in the Ohio Plan of Trade and Industrial Education.

2. To establish sufficient and professionally acceptable evidence for the issuance of undergraduate credit toward a degree in a cooperating teacher-training institution or for advanced certification.

It is evident, therefore, that the test must be designed for a range and level of technical knowledge and skill considerably above that expected of high school students or apprentices, and also above that of the average journeyman worker. We are appealing to the superior individual in any given skilled or technical occupation.

SCOPE AND NATURE

An occupational competency test should adequately but not over-extensively cover both the practical performance and the theoretical aspects of the applicant's technical knowledge related to his skilled or technical occupation. It should likewise include the manipulative skills upon which successful employment and therefore effective vocational teaching are dependent.

Since the scope of most occupations is rather vaguely defined and frequently subject to change, it is necessary to outline the skill and technical content contained within the occupation prior to determining the necessary coverage of the examination.

Each such outline or occupational description should be based on an analysis of the occupation as practiced in employment rather than based upon the content of any course taught in a school. Furthermore, the outline of the scope of the occupation should preferably reflect the more standard aspects of the occupation as practiced on a statewide or national basis rather than on the more limited and flexible specialization which may be peculiar to a particular geographic area.

Competency tests will be given as needed in the several teacher education centers throughout the State. It is desirable, therefore, to maintain uniformity of standards, procedures, and the arrangement and form of material used in the testing, insofar as it is practical to do so. The suggestions to examiner and instructions to candidates included with each test are intended to contribute to that end.

GENERAL POLICIES OF APPLICATION

An occupational competency examination should adequately cover both the practical performance and the theoretical aspects of the occupation. In other words, the content of the examination should be developed within the scope of the qualifications (both manipulative and related knowledge) established for the occupation. To accomplish this it is obviously necessary to possess complete knowledge of the occupation and to be able to answer the question, "What are the manipulative skills and the related technical knowledges required for successful employment?" This requirement makes it impossible for any one individual to be able to construct or validate an occupational competency examination without the aid of experts from within the occupation itself.

The over-all plan of examination development is therefore predicated upon the use of occupational advisors. These individuals may be selected either directly from industry or from existing educational programs, but in either case they must be selected for their outstanding ability and their position as masters in their occupation. These sources of occupational information must be directed by a teacher educator who is skilled in examination construction. With such a plan in use a better than average chance should exist for producing an occupational competency examination which will truly measure the competency of an individual.

Occupational experience and competency shall be evaluated by oral, written and practical examination. In order to carry out this assignment in an orderly, systematic and uniform manner and to eliminate overlapping and duplication of effort, a plan of examination development and coordination has been adopted. This plan provides for the construction of occupational competency examinations to be carried out at each of Ohio's approved vocational teacher education institutions for Trade and Industrial Education. Each of these centers may construct examinations in relation to its personnel resources and as the need exists. Duplication of the examinations shall emanate from the Instructional Materials Laboratory located at The Ohio State University.

SECTION B. TEST DEVELOPMENT PROCEDURES

OCCUPATIONAL ANALYSIS

An occupational competency test should be developed with the use of an occupational analysis in order to determine the skills and technical knowledge needed in the particular occupation for which the test is being prepared.

1. It should be comprehensive in nature.
2. It should be separated into divisions, subdivisions and finally into operations or manipulative skills.
3. It should contain the applications of mathematics, science and occupational information needed for efficient job procedure.

NOTE: For detailed analysis procedures, see Study Guide No. D-2.

WEIGHING OF ELEMENTS FROM THE ANALYSIS

Since all the elements contained in the analysis cannot be covered in one test, care must be taken to select the basic skills and knowledges for use in the test construction.

1. Weigh each element of knowledge or skill according to its relative importance.
2. Determine exactly what each selected element will measure.
3. Each element selected should provide a basis for determining competency.

SELECTING SPECIFIC ELEMENTS FOR TESTING

1. Provide enough questions and manipulative skills to sample all phases of the occupation.

2. Include the use of actual tools, equipment and materials of the specific occupation.

3. Include the application of mathematics, science, safety and other technical knowledge pertinent to the occupation.

4. The manipulative processes to be tested should be selected carefully so that enough basic skills will be required to show mastery of the occupation.

TEST CONTROLS

1. No uniform time allowance can be set for all examinations.

2. Length of test should vary in accordance with the amount of skill and technical knowledge needed.

3. Suggested time should be one-half day for the technical test and a full day for the manipulative test.

4. Determine the total test time according to the performance of one or more competent individuals.

SECTION C. TEST CONSTRUCTION

TECHNOLOGY TESTS

This should be a paper and pencil test designed for convenience in administering and scoring. Its purpose is to determine the extent of the candidate's ability to apply his knowledge and understanding of the basic principles involved in his occupation. While some of these abilities will be revealed in the performance test, the written test is a means of sampling intangibles, such as judgments, appreciations, and understandings and not his mere memory of facts, figures and processes. It is with this in mind that the following suggestions for test construction are offered.

1. Select appropriate measuring techniques. It is not necessary to make use of all the known types of objective tests. The variety used should be kept to a minimum.
    (a) From the selected elements, determine the number of questions needed in each division of the test.
    (b) Provide enough questions to sample all phases of the occupation, for example, mathematics, science, safety, procedures, knowledge of materials, interpretation of drawings and data, etc.
2. Prepare at least two questions for each element selected for the test.
    (a) Prepare questions that sample all areas of the occupation, according to the selected element. The best of the pair can be selected later for inclusion in the test. An alternate item may be used instead of the original pair for closely related elements.

(b) Make test questions reflect practical problems, expressed in occupational language and described in typical settings rather than the more academic or "schoolish" type of question. Caution should be exercised in the use of questions that place a premium on memory.

(c) Use a wide variety of types of questions to provide the examinee with an opportunity for varied forms of responses. For example, include questions which call for calculations, sketches to be drawn, diagrams to be interpreted, situations to be analyzed, procedures to be listed, selections to be made, cases diagnosed and recommendations given.

(d) State all questions clearly, simply and directly. Avoid the use of negative questions. Provide illustrations where necessary. Be sure that there is only one possible interpretation to each question. Never use a trick question!

(e) When writing objective types of tests give simple, clear, but explicit directions and include a sample statement and answer. The following recommendations should be kept in mind.

   (1) Multiple-choice type questions should be used wherever possible, with at least 150 statements (questions) for reliable scoring. Use 4 answers (choices) in each question rather than 3 or 5.

All items must be plausible, but only one correct. This is of special importance since persons with inadequate knowledge of the occupation would normally guess the answer. Questions that can be answered correctly by a layman should be changed. The correct item should contain approximately the same number of words as the other items. Any consistent pattern giving a clue to the correct answer should be avoided.

(2) True-false type questions should be used only when important informational material does not lend itself to multiple choice questioning.

(3) Pictorial and matching type questions are useful in some occupations, especially with reference to tools, instruments and symbols. Available answers in a matching test should be at least 4 items greater than the base list.

(4) Completion or short-answer questions should be used sparingly.

3. Have one or more other persons read the questions as a check against possible errors, misinterpretation, or ambiguity. Have questions reviewed by an accepted specialist in the occupation in which the test is written. Keep in mind the confidential nature of this material in selecting such specialists.

4. Use a format for the examination that appears clean-cut, well organized and neat. See sample test forms in the Appendix.

   (a) Keep questions well spaced and distinct from the answer space.

   (b) Maintain uniform, clean-cut margins.

   (c) Provide a definite answer space; be sure it is adequate for any satisfactory responses. Keep answer spaces aligned.

   (d) Have all the examinee's work including calculations appear on the sheet.

   (e) Arrange the space for the answers to facilitate checking. Recommended practice would provide for all answers to appear on the same side of each page.

   (f) Provide the examination with a "cover" page containing space for:
   (1) identification, (2) directions to the candidate, (3) other essential instructions and information.

   (g) If pertinent, arrange for use of blueprints, diagrams, schematics, drawings, etc.

5. Develop answer sheet for the examination.

6. Develop a scoring technique for the examination, indicating the weight to be given each question and the possible total score.

7. Prepare a statement defining the scope of examination or the total possible coverage in the occupation.

8. Prepare suggestions to the examiner for "Test Administration Procedures." See Appendix for sample.

9. Prepare "Cover Page - Technology Examination." See Appendix for sample.

10. Keep all questions and information about the test confidential. Destroy all papers used in developing the test.

11. An experimental tryout should be made with a small group of qualified individuals. Watch carefully for any irregularities such as exceptionally easy or difficult questions or questions requiring an abnormally long period of time to answer. Also note all questions or comments made by these individuals after the completion of the test.

12. An item analysis should be made after the experimental tryout. Determine the relative difficulty and reliability of each item.

13. Revise the test where needed, basing revision on the findings of the item analysis, which will indicate difficult, ambiguous, and confusing questions. If extensive revisions have been made, an additional tryout should be made.

* Item 10 thru 12 used only to validate test.

REMEMBER THIS TEST IS TO HELP THE CANDIDATE REVEAL WHAT HE KNOWS ABOUT HIS OCCUPATION.

PERFORMANCE TESTS

The purpose of the performance test should be to determine the candidate's ability to do the manipulative work common to the occupation in which he is being examined. This can best be done by having the candidate actually perform a series of carefully selected operations and procedures representative of his occupation. It is important that conditions under which the examination is given be standardized as far as possible. The following suggestions are offered for this purpose.

1. Select appropriate measuring techniques suitable to the occupation.

2. Prepare a list of possible experiences (jobs, operations or procedures) which may be used for examination purposes. See example in Appendix.

    (a) The type jobs, operations, or procedures should sample as many phases as feasible.

    (b) The type jobs, operations, or procedures selected should be typical of those found in the day-to-day work of the occupation. Avoid test items that are peculiar to a given geographic area.

3. Manipulative processes assigned to the candidates do not necessarily need to be complete but those portions most valuable for measuring competency in a particular phase of the work should be included.

4. Select manipulative processes which require a minimum of lost time and extended repetition.

5. Assigned activities may be selected for a given examination by any combination of jobs, operations, or procedures.

6. Provide a variety of activities suitable for testing candidates in both the general area of the occupation and specialized divisions.

7. Provide assignments which do not require extensive preparations and expenditure of unreasonable funds.

8. Provide practical tests which can be conducted in a well-equipped school shop, laboratory or commercial establishment.

9. Provide occupational activities which the average instructor should be able to perform to a marked degree of proficiency.

10. Suggest performance assignments which can be evaluated objectively by a competent and unbiased examiner.

11. Suggest a variety of assignments in order to determine the all-around ability of the candidate.

12. Provide assignments requiring different periods of time for completion, so that a variety of occupational practices may be completed within the time limit established.

SECTION D. TEST ADMINISTRATION PROCEDURES

SUGGESTIONS TO THE EXAMINER

1. Determine whether candidate is to be given a test in the entire occupation or a test in some specialized division of the trade. Select projects accordingly. Refer to the topical outline which shows the scope of the examination.

2. Make a survey of facilities, equipment and materials available for the test.

3. Select from the suggested list of projects or procedures those jobs deemed most practical for the test, considering available equipment and facilities.

4. Consult flat rate or commercial rates to obtain the time limit in which to complete the jobs or procedures. From the flat rate determine a figure that will be fair to the candidate, based on the quality and completeness of the tools, instruments and/or equipment with which he must work. In addition, consideration must be given to the fact that the candidate is to be examined and is not doing the job as a routine part of his daily work.

5. Total the compiled time limits, as determined in preceding paragraph, to determine if the total time for all selected projects fulfills or exceeds the time allotment for the entire practical test. (Test not to exceed time limit set by the examining agency.)

6. Assemble all tools, parts, units and equipment required for the test. Secure definite commitments for all equipment to be used for the test for the day and hour the test is to take place.

7. Personally test all equipment, instruments and tools to make certain they are in proper operating and good working condition.

8. Double check all supplies and materials to be certain that no time will be lost by the candidate due to oversight or omission. Strict attention to this will prevent the possibility of protest on the part of the candidate if the final ratings are not favorable to him.

9. Take into consideration the shop or laboratory facilities available for conducting the examination. The performance assignments provided should be of sufficient variety and number that the examining agency may select those that fit the equipment available.

10. Analyze the performance test to determine the amount, type, and quality of materials needed and the tools and equipment required. For assignments requiring preliminary preparation or "set-up", provide complete specifications so that the examiner can have everything on hand and ready before examination time.

11. Prepare directions to the examinee for each performance assignment. These are to be given the examinee as needed and should contain all the information necessary for him to

carry out the work successfully. These directions might contain one or more of the following items: (See Appendix for sample of Direction and Rating Sheet.)

(a) Description and explanation of the performance assignment.

(b) Sketch, working drawing, or print if needed.

(c) Directions concerning the sequence to be followed in completing the assignment (unless the examinee is to work out his own sequence).

(d) Suggestions, regulations or instructions for carrying out the work, for example, use of handbooks, special equipment, reference charts, etc.

(e) Any information, formulas, data or forms which the examinee should provide.

12. Indicate any special items to be rated which may be needed for peculiar or involved assignments in addition to the "Performance Test Rating Sheet." See Appendix for sample of the rating sheet.

13. Verify your final testing and rating plan with those persons of the examining agency responsible for the preparation of the examination, being extremely careful to keep all information strictly confidential.

SECTION E. EVALUATION OF TEST RESULTS

RATING OF CANDIDATES

In any measuring device, particularly those measuring competency, it is essential that each candidate be rated fairly and impartially. Each test should be so constructed that little judgment is required on the part of the person rating the participant. This is not impossible for that portion of the test evaluating technical competency but becomes of serious concern when testing performance or operational ability.

A successful competency test must, therefore, be so constructed that (1) the technical competency section may be evaluated without variation by any number of persons and (2) the performance sections may be evaluated with little variation by persons competent within the particular occupation.

This implies that regardless of where an achievement test is given the evaluation of the results must not be based upon the differences within the evaluating or rating personnel.

In general each individual should be rated on one or more of the following:

1. His scores compared to the established norms for the test.
2. His level of competency compared to his intelligence and/or aptitude.
3. His competency compared to others being tested.
4. His competency compared to that of recognized competent experienced workers.

EVALUATION OF TEST

The basic premise of this section is that all tests can be improved. Thus, it should be of value to describe some of the more common procedures for evaluating a test to determine whether or not it is attaining the desired results.

For every test several general questions such as the following need be answered.

1. Does this test measure those things for which it was developed?
2. Do the scores resulting from this test provide data useful in evaluating individual competency?
3. Are the scores generally well distributed over the range of possible scores?
4. Do scores tend to be grouped at either the lower or higher end of the test range?
5. How well does the test sample the elements of the particular occupation?

In addition to these general questions involving the total test, it will be important also that the results for each individual question be analyzed.

For example:

1. How well does each item discriminate between the competent and incompetent individuals.
2. Are questions poorly phrased, vague, or so worded that they become trick or catch questions.

3. What questions appear not to be essential in terms of test results?

4. Are too many or too few questions contained in the test?

5. Which items are too easy or too difficult?

It is recognized that this is only a casual treatment of the field of test evaluation and that no attempt has been made to propose method. It is anticipated that persons desiring to evaluate a new test will go to one or more of the resource materials identified in the bibliography for detailed procedures.

ESTABLISHING TEST STANDARDS

Following such research as described previously to evaluate test items and the overall test for purposes of making certain that all items are satisfactory the next step is to establish standards for the test.

This is normally accomplished by giving the test to a selected group of persons who have proven their competency in a particular occupation.

The results obtained by this procedure permits the comparison of the scores of unknowns taking the test to the norms established by persons of known competency.

Those persons interested in more detailed information on test standardization are referred to the publications contained in the bibliography.

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APPENDIX

OBJECTIVES IN SELECTING SUGGESTED PERFORMANCE JOBS

1. To provide a variety of performance jobs suitable for testing candidates in general automobile mechanics or specialized divisions of the trade.

2. To provide jobs which do not require extensive preparations and expenditure of large sums of money.

3. To provide practical tests which can be conducted in a well equipped school shop, or local garage.

4. To provide jobs which the average automobile mechanics instructor should be able to perform to a marked degree of proficiency.

5. To suggest jobs which can be evaluated with an objective rating by a competent and unbiased examiner with fairness to the candidate.

6. To suggest a variety of assignments in order to determine the all-around ability of the candidate.

7. To provide assignments requiring different periods of time for completion, so that a variety of projects may be selected to total the time limit of the entire test.

SUGGESTIONS TO EXAMINER PREPARING FOR EXAMINATION

1. Determine whether candidate is to be given a test in Automobile Mechanics, or a test is some specialized division of the trade. Select projects accordingly. Refer to the topical outline which shows the scope of the examination.

2. Make a survey of facilities, equipment and materials available for the test.

3. Select from the suggested list titled, An Example of a Performance Test in Automotive Mechanics, on page 25, jobs deemed most practical for the test, considering available equipment and facilities.

4. Consult flat rate manuals to secure time limit to complete the job or jobs. From the factory flat rate figures compile a figure fair to the candidate, based on the quality and completeness of the tools and equipment with which he must work. In addition, consideration must be given to the fact that the candidate is to be examined and is not doing the job as a routine part of his daily work.

5. Total the compiled time limits, as determined in preceding paragraph to determine if the total time for all selected projects fulfills or exceeds the time allotment for the entire practical test. (Test not to exceed time limit set by the Examining Agency.)

6. Assemble all tools, parts, units and equipment required for the test. Secure definite commitments from the owners of automobiles to be used for the test for the day and hour the test is to take place.

7. Personally test all equipment and tools to make certain they are in proper operating and good working condition.

8. Double check all supplies and materials to be certain that no time will be lost by the candidate due to oversight or omission. Strict attention to this will prevent the possibility of protest on the part of the candidate if the final ratings are not favorable to him.

AN EXAMPLE OF A PERFORMANCE TEST IN AUTOMOTIVE MECHANICS

1. Adjust a set of hydraulic brakes. (Time allowed contingent on car which may require a minor or a major brake adjustment.)

2. Adjust tappets of a six cylinder engine. (Examiner must stipulate if it is a valve-in-head engine on a test stand or in the automobile or an L-head engine on a test stand or in the automobile, to determine time to complete the job.)

3. Time the ignition system of an automobile. Check timing with a timing light.

4. Fit a piston pin to a piston and connecting rod. Assemble the piston and connecting rod ready to install in an engine.

5. Measure the bore, out of round and taper of all cylinders of a six (6) cylinder automobile engine.

6. Overhaul an automobile generator and test it in an electric test bench. List all tests you make and state reason for making each of the tests named.

7. Remove a valve from an engine. Reface valve, recondition seat, grind to finish and install in the engine. (See statement under #2.)

8. Install the cylinder head of an automobile engine. Make a sketch showing the order in which the cylinder head bolts or studs were tightened.

9. Tune the engine of an automobile. List all tests or checks you make to complete the job, in the sequence you made them.

10. Check and correct the "toe-in" of the front wheels of an automobile. List all operations you performed to do the job.

11. Check the camber and caster of the front wheels of an automobile. List all measurements on paper.

12. Remove a piston assembly from an automobile engine, install new piston rings and replace piston assembly in the engine.

13. Adjust the ring gear and pinion clearance of a hypoid type rear axle.

14. Disassemble carburetor. Check all parts and settings with manufacturer's specifications. Install overhauled carburetor on live engine, start engine and adjust carburetor.

15. Bleed the hydraulic brake system of an automobile.

16. Test the clearance of one main bearing of an automobile engine from which the oil pan has been removed.

17. Test the clearance of one connecting rod bearing of an automobile engine from which the oil pan has been removed.

18. Check the valve timing of an automobile engine with the valve timing marks.

19. Overhaul an automobile fuel pump. Test the fuel pump you overhauled and indicate the results of the test.

20. Adjust and aim the headlights of an automobile. List all operations you performed to complete the job.

21. Make a check of an automobile and list all repairs, adjustments and parts which you would replace to put the automobile in condition for safe operation on the highway.

22. Remove and check the ignition system of a Ford V-8 engine. Make all replacements and adjustments to place it in first class condition. Install on engine and start engine.

INSTRUCTIONS TO THE CANDIDATES FOR TAKING THE PERFORMANCE TEST

This practical test is your opportunity to demonstrate how well you can perform the various operations, processes, and/or procedures of your trade. The examiner will observe and rate you on the following:

1. PROCEDURE AND METHOD of doing the work or job assigned.

2. SKILL in using tools, machines, equipment, materials, etc.

3. SPEED developed by you as compared with a first class worker.

4. GENERAL QUALITY of workmanship.

5. PERSONAL APPEARANCE in regard to dress, cleanliness, neatness, etc.

Taking this Performance Test may be a new and strange experience for you, therefore, it is suggested that you follow the instructions listed below, very carefully.

1. Obtain all the necessary tools, materials, etc., as directed by the examiner.

2. Examine your work space or station carefully to see that the machine, equipment, apparatus, etc., are in good working order.

3. Address all questions regarding the work station, work assignment, equipment, etc. to the examiner.

4. Avoid talking to other candidates during the examination.

5. Select the method or procedure which you deem best for each job, operation or procedure on the basis of the equipment available and then plan all steps accordingly.

6. Advise the examiner when you have completed your assignment. Have him check and identify it with your number and give you the next assignment.

7. Request permission from the examiner if it becomes necessary for you to leave the shop.

If you decide to withdraw from the examination, sign the Withdrawal Statement on the Performance Test Rating Summary Sheet.

Sign This Sheet with your name and number in the space below and return to the examiner before the examination begins. Your signature indicates that you understand the instructions for taking the test.

Signature

Number

Examiner should indicate by checking one (1) statement, the extent to which he would endorse this candidate for teaching:

1. Cannot endorse ______
2. Endorse with hesitation ______
3. Endorse ______
4. Endorse with confidence ______
5. Endorse with enthusiasm ______

CANDIDATE'S STATEMENT OF WITHDRAWAL

I hereby indicate my voluntary withdrawal from the above examination.

____

(Signature) (Date) (Hour)

STATEMENT OF EXAMINER

The above rating represents my best judgment of the candidate.

____

(Signature of Examiner)

EXAMINER'S COMMENTS OR RATINGS

Explanations on ratings below three (3) should be explained below.

1. Procedure ______________________________
2. Skill ______________________________
3. Speed ______________________________
4. General Qualities ______________________________
5. Personal Appearance ______________________________

General Comments on Endorsement

____

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EXAMPLE OF AN EXAMINATION COVER PAGE

TRADE & INDUSTRIAL EDUCATION
IN-SERVICE TEACHER IMPROVEMENT
STATE OF OHIO

TECHNOLOGY EXAMINATION
IN
(NAME OF OCCUPATION)

DIRECTIONS
(Read these instructions carefully)

1. Read each question carefully and completely before you answer it.
2. Begin by answering those questions of which you are most certain of the answer. Leave the more difficult ones until last.
3. If you are uncertain about the meaning of a question, explain your understanding of the question in writing directly below it and then answer accordingly.
4. Place all answers in the place provided. Be pointed and brief but careful to avoid being misunderstood.
5. Show all your mathematical calculations on the examination sheets, using the reverse side if necessary.
6. Sketches should be neat and all work clear and legible.
7. Be sure that you do not skip any pages. Read over the questions and your answers if you finish before time is called.

REMEMBER THIS EXAMINATION IS YOUR OPPORTUNITY TO LET THE EXAMINER KNOW HOW WELL INFORMED YOU ARE ABOUT YOUR TRADE

CANDIDATE'S STATEMENT OF WITHDRAWAL

I hereby indicate my voluntary withdrawal from this examination.

Signature ____________ Date ____________ Hour ____________

Candidate No. ____________

Total Test Points ____________

Score ________ Rank ________

RATING ____________

EXAMPLE

MULTIPLE CHOICE TEST

Trade & Industrial Education
Kent State University
Examining Agency

TRADE COMPETENCY TEST
MACHINE - Technology
Page 1 of 1 page

Candidate's No. ________ Date__________19________ Score________________

General Instructions: The test you are about to take is designed to test your knowledge of the trade information related to the skills of your trade. Be fair with yourself. Do not get hurried and "fussed." You are not expected to answer all of the questions on this examination. RELAX!

Directions: Each statement needs a word, a figure, or a phrase to make it correct. Only one of the choices listed is correct. Place the number of the choices you make in the space provided at the right hand edge of the sheet.

1. Cutting speed in feet per minute for turning machine or soft steel with a high speed steel bit should be - (1) 60 (2) 120 (3) 80 (4) 160 . . . . ( )

2. A spindle speed adjusted to give a cutting speed of about 35 feet per minute would be suitable for cutting threads on -
(1) soft steel, (2) tool steel (annealed), (3) brass, (4) cast iron . . . . . ( )

3. To turn an included angle with the compound rest, when the included angle is 100°, swivel the compound - (1) 50°, (2) 80°, (3) 40°, (4) 10° . . . . . ( )

4. The taper commonly used on lathe centers is the- (1) Jarno, (2) Morse, (3) Brown and Sharpe, (4) American Standard . . . . ( )

5. A ½ - 13 thread is (1) N.F., (2) S.A.E., (3) Metric, (4) N.C. . . . . ( )

6. A thread pitch gage is used to measure - (1) the number of threads per inch, (2) the set of the cutting tool, (3) the depth of the thread, (4) the thread lead . . . . ( )

7. The center gage is used to center the - (1) center drill, (2) work, (3) lathe centers, (4) cutting tool . . . . ( )

8. Center holes should be drilled - (1) the depth of the drill point, (2) half way up on the countersink, (3) slightly over the full depth of the countersink, (4) slightly under the full depth of the countersink . . . ( )

EXAMPLE

SHORT ANSWER TEST

Trade and Industrial Education
Cleveland Board of Education
Examining Agency

TRADE COMPETENCY TEST
MACHINE - Technology
Page 1 of 1 page

Candidate's No.____________Date____________19________Score____________

Directions: In the space provided to the right of each item, place the word, words or figures which best answer the question. Be sure to make your meaning clear, but use only the words that are actually necessary. One (1) point is allowed for each item correctly answered. Item S (the first or sample item) is correctly answered.

S. What size micrometer should be used to measure a 1.126 diameter shaft? . . . . 2 inch S

1. What is the ratio of the worm-wheel in the standard dividing head? ________1

2. What is the effect of grinding a twist drill with lips of different lengths? . . . . ________2

3. How is the swivel bar of a taper attachment graduated? . . . . ________3

4. How many adjustable jaws does a standard follower rest have? . ________4

5. How many degrees do you swivel the compound rest to cut a National Coarse Thread? . . . . ________5

6. What is the essential difference between a cutting tool used for brass and one for steel? . . . . ________6

7. If the pitch of a double-thread is 1/16", how far will it advance in one complete turn? . . . . ________7

8. Approximately how much under nominal size does a rose reamer ream holes? . . . . ________8

9. What is meant by a 14 x 8 lathe? . . . . ________9

10. What is the pressure angle of a stub-tooth gear? . . . . ________10

11. The difference in height of the ends of a 10 inch sine bar is 5 inches. What angle is indicated? . . . . ________11

EXAMPLE

DIRECTION & RATING SHEET

Candidate No. ________

Assignment No. ________

1. **ASSIGNMENT**

2. **SPECIAL DIRECTIONS**

3. TIME RECORD							5. JOB RATING	
Time Started	HR	M	Time Finished	HR	M	Total	Specific Items Rated For This Assignment	Pts.
							1	
4. NOTE: CHECK these items as you comply with them: ( ) Record time ( ) Have job inspected ( ) Return this direction sheet and secure your next job.							2	
							3	
							4	
							5	
							Total Points	

* See Performance Test Rating Sheet for Rating Scale

EXAMPLE

PERFORMANCE TEST RATING SHEET

Candidate's Number________ Date________ 19____ Place of Test________________

Trades________________ Score______ Rank______ Result ________________

This rating sheet is provided for the use of persons administering the trade examinations, to aid in securing the most objective rating possible on those factors for which the candidate is being tested.

RATING will be given on the basis of a five (5) point scale. The lowest rating will be one (1) and the highest will be five (5) as shown. Insert figure opposite factor being rated.

- (1) Inadequate - for occupational success
- (2) Poor - below average
- (3) Average - for a good workman
- (4) Good - better than average
- (5) Superior Quality

FACTORS TO BE RATED

Job Performance	WT	Score	Final Score	General	Final Score
1				1. Procedure - Items such as (1) interpretation of assignment, (2) selection of method, (3) selection and preparation of tools, material and equipment	______
2					
3					
4				2. Skill - with tools, equipment, machinery, etc.	______
5					
6				3. Speed - compared with first class worker	______
7					
8				4. General Quality of workmanship	______
9					
10				5. Personal Appearance - Dress. (Costume, uniform, shopcoat, etc.)	______
Total Points				Total Points	
Maximum Points				Maximum Points	

EXAMPLES OF WRITTEN TECHNOLOGY TESTS

1. Multiple Choice Test
2. Matching Test
3. Short Answer Test
4. Procedure Test
5. Order Arrangement Test

Note: The examples of tests, and the questions appearing in them, on the pages to follow are suggestive only. No attempt has been made to provide a complete examination in any one trade or occupation.

Before preparing such types of tests, the persons writing them should consult a good text or reference dealing with the preparation of informal tests in order to refresh their memories on the techniques used in their preparation.

EXAMPLE

MATCHING TEST

Trade and Industrial Education
University of Cincinnati
Examining Agency

TRADE COMPETENCY TEST
COSMETOLOGY - Technology
Page 1 of 1 page

Candidate's No. ____________ Date ____________ 19 __________ Score ____________

Directions: The words and phrases in the left-hand column are significant in connection with an expression in the right-hand column. Match them properly by placing the figure perceding the item in the left-hand column in the parentheses at the right of the matching item. Two points are allowed for each item correctly matched. Item S (the first or sample item) is correctly matched.

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1. Buccinator
2. Cardiac
3. Extensibility
4. Frontalis
5. Involuntary
6. Meat
7. Muscle
8. Myelogy
9. Orbicular Oris
10. Orbicularis oculi
11. Osseous
12. Quadratus Labii
13. Superiorius
13. Tendons
14. Triangularis
15. Voluntary

S. Locomotion of the body (5) S
a. The study of muscles ( ) 1
b. Tissue made up of fibres ( ) 2
c. Muscle under control of will ( ) 3
d. Muscle found only in the heart ( ) 4
e. Muscle used to close eyelids ( ) 5
f. Round or flattened bands which attach muscles to bones ( ) 6
g. Muscle that raises upper lip ( ) 7
h. Muscle that retracts the cheeks; retracts angle of the mouth ( ) 8
i. One of the characteristics of a muscle ( ) 9
j. Human muscular tissue may roughly be compared to ( ) 10

EXAMPLE

PROCEDURE TEST

Trade and Industrial Education	**TRADE COMPETENCY TEST**
University of Toledo	**MACHINE - Technology**
Examining Agency	**Page 1 of 1 page**

Candidate's No. ____________ Date ____________ 19 ________ Score ____________

Directions: The list below contains two type jobs commonly done in the machine shop. In each job are a number of procedure steps, but these steps are not in the correct order. Examine the steps in each job and decide which step should come first, which should come second and so on.

In the parentheses to the right of the step that you think should come first write the number one. Write the number two in the parentheses opposite the step you think should come second. Continue until each step has been numbered.

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1. To mount work in a four-jaw independent lathe chuck: (Five steps)

   (1) Revolve the spindle slowly and with a piece of chalk mark the high spot on the work while it is revolving . . . . ( )

   (2) When the work is running true in the chuck, tighten each jaw, one after the other in sequence, until all four jaws are clamping the work securely . . . . ( )

   (3) Adjust the jaws to receive the work . . . . ( )

   (4) Stop the spindle, locate the high spot on the work and adjust the jaws in the proper direction to true the work . . . . ( )

   (5) Fasten the work in the chuck by turning the adjusting screws of the chuck . . . . ( )

2. To prepare a piece of round stock for turning between centers: (Five steps)

   (1) Layout the length . . . . ( )

   (2) Saw the stock to correct length . . . . ( )

   (3) Face one end of the stock and center drill to correct depth . . . ( )

   (4) Chuck stock accurately in a four-jaw independent chuck . . . . ( )

   (5) Face the second end to correct length and center drill . . . . . ( )

EXAMPLE

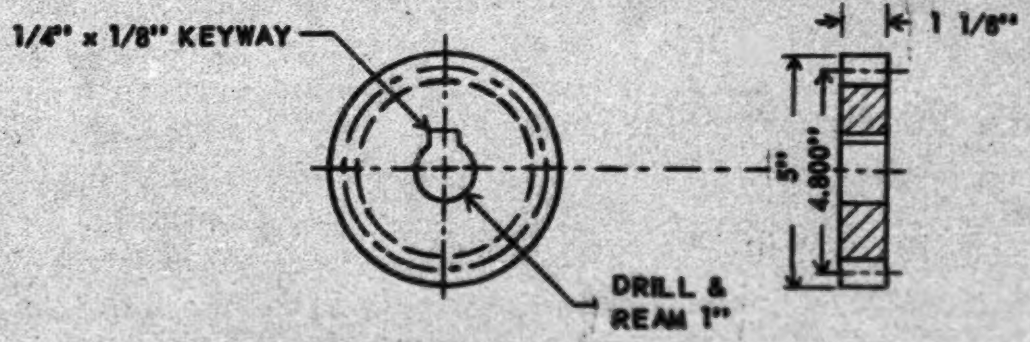
ORDER ARRANGEMENT TEST

Trade and Industrial Education
Ohio State University
Examining Agency

TRADE COMPETENCY TEST
MACHINE - Technology
Page 1 of 1 page

Candidate's No.__________ Date__________19______ Score__________

Directions: This problem is intended to test your ability to analyze a machine job and arrange the operations in the most logical order. Study the drawing carefully, then select and record the number of the operation from each group listed that will complete the job in proper sequence.



1. (1) center stock (2) chuck stock (3) face side (4) bore . . . . ( )
2. (1) cut teeth (2) cut key-way (3) turn (4) face side A . . . . ( )
3. (1) ream (2) Face side B (3) turn (4) drill . . . . ( )
4. (1) drill (2) ream (3) lay out key-way (4) face side B . . . . ( )
5. (1) center stock (2) cut key-way (3) mount on mandrel (4) bore . . . ( )
6. (1) set up index head (2) drill (3) ream (4) turn . . . . ( )
7. (1) lay out key-way (3) cut teeth (3) face side B (4) undercut . . . ( )
8. (1) set up index head (2) bore (3) ream (4) chuck. . . . . ( )
9. (1) turn (2) cut teeth (3) face side A (4) ream . . . . ( )
10. (1) bore (2) lay out key-way (3) turn (4) cut key-way . . . . ( )
11. (1) ream (2) undercut (3) turn (4) cut key-way . . . . ( )